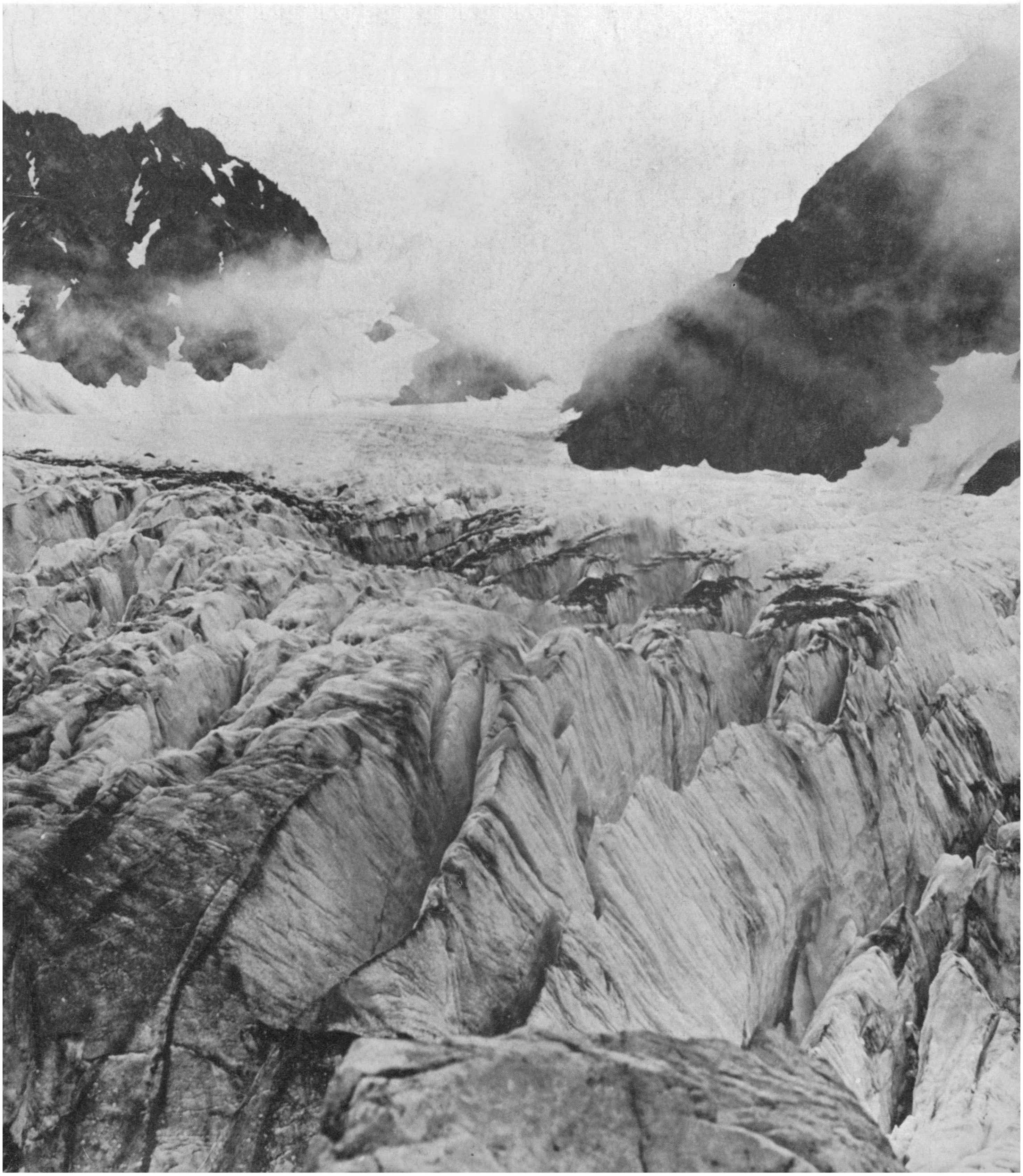
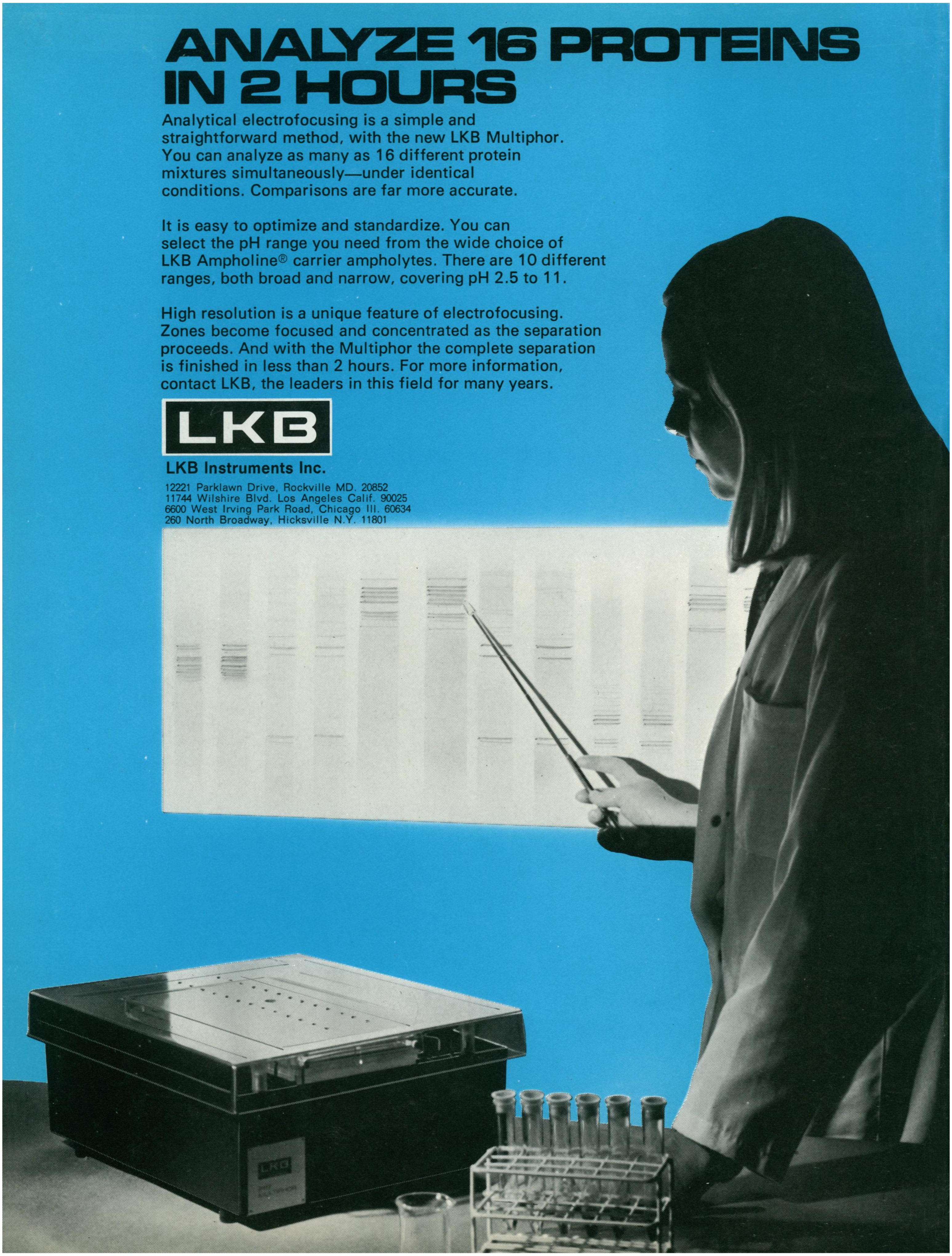
SCIENCE

6 December 1974

Vol. 186, No. 4167

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE




ANALYZE 16 PROTEINS IN 2 HOURS
Analytical electrofocusing is a simple and straightforward method, with the new LKB Multiphor. You can analyze as many as 16 different protein mixtures simultaneously—under identical conditions. Comparisons are far more accurate.
It is easy to optimize and standardize. You can select the pH range you need from the wide choice of LKB Ampholine® carrier ampholytes. There are 10 different ranges, both broad and narrow, covering pH 2.5 to 11.
High resolution is a unique feature of electrofocusing. Zones become focused and concentrated as the separation proceeds. And with the Multiphor the complete separation is finished in less than 2 hours. For more information, contact LKB, the leaders in this field for many years.
LKB
LKB Instruments Inc.
12221 Parklawn Drive, Rockville MD. 20852
11744 Wilshire Blvd. Los Angeles Calif. 90025
6600 West Irving Park Road, Chicago Ill. 60634
260 North Broadway, Hicksville N.Y. 11801
LKB

6 December 1974

Volume 186, No. 4167

SCIENCE

SCIENCE is published weekly, except the last week in December, but with an extra issue on the fourth Tuesday in November, by the American Association for the Advancement of Science, 1515 Massachusetts Ave., NW, Washington, D.C. 20005. Now combined with The Scientific Monthly®. Second-class postage paid at Washington, D.C. Member rates on request. Annual subscription $40; foreign postage: Americas $6, overseas: $8, air lift to Europe $20. Single copies $1 (back issues, $2) except **Guide to Scientific Instruments** which is $4. School year subscription: 9 months $30; 10 months $33.50 Provide 6 weeks notice for change of address, giving new and old address and zip codes. Send a recent address label. **Science is Indexed in the Reader's Guide to Periodical Literature.**

AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

REPORTS

The American Association for the Advancement of Science was founded in 1848 and incorporated in 1874. Its objects are to further the work of scientists, to facilitate cooperation among them, to improve the effectiveness of science in the promotion of human welfare, and to increase public understanding and appreciation of the importance and promise of the methods of science in human progress.
Postmaster: Send Form 3547 to SCIENCE, 1515 Massachusetts Avenue, NW, Washington, D.C. 20005.

COVER

Blue Glacier, Olympic Park, Washington. See page 925. [Geological Survey, U.S. Department of the Interior, Washington, D.C.]

A little list of topics

Angiography

Audiovisual equipment and supplies
- Slide projectors
  - Auxiliary equipment
- Motion-picture projectors
  - Auxiliary equipment
- Television projectors

Autoradiography

Chemicals
- Biochemicals
- Protein/polypeptide reagents
- Electrophoresis reagents
- Pharmaceutical intermediates in bulk
- Thin-layer chromatography supplies
- Dyes and stains
- Liquid scintillation reagents
- Clinical chemicals

Cinefluorography

Cinephotomicrography and time-lapse photography

Clinical photography

Close-up photography

Copying

Dental radiography

Electron micrography

Films for special medical-photographic techniques

Fundus photography

General photography
- Cameras
- Color films
- Black-and-white films
- Color papers
- Black-and-white papers

Graphic arts photography
- Films and papers
- Printing plates
- Processing equipment

Gross-specimen photography

Holography and optical-data processing

Infrared photography

Instruction and education
- Audiovisual products
- Color microfiche and microfiche readers
- Micropublishing

Instrumentation photography
- Light-beam oscillography
- Cathode-ray tube photography
- High-speed photography
- Black-and-white films
- Color films
- Photographic papers

Mammography

Medical radiography
- Films
- Processing equipment
- Minification equipment
- Processing chemicals
- Accessories

Micropublishing

Motion-picture photography
- Cameras (super 8)
- Films (super 8)
- Films (16 and 35 mm)

Nuclear medicine

Photofluorography

Photomacrography

Photomicrography

Radiation therapy

Radiograph copying

Radiograph subtraction and duplication

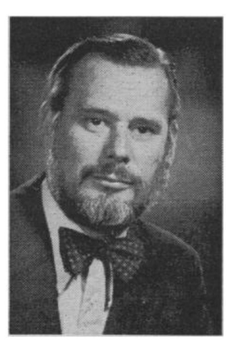
Records and administration
- Microfilming
- Computer-output microfilm
- X-ray minification

Thermography

Ultrasonic imaging

Ultraviolet and fluorescence photography

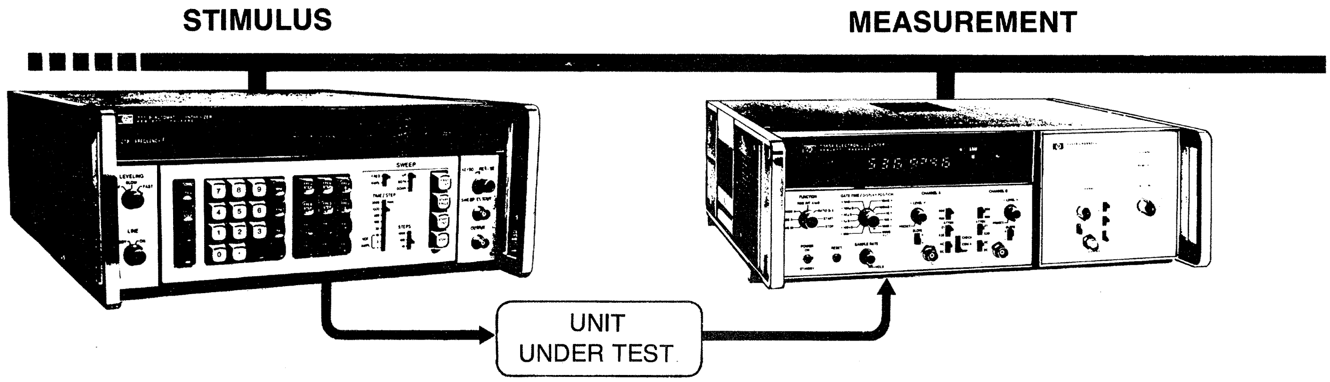
The health-care professions and biological science find important work for Kodak products and services. Knowledge, though, tends to be fragmentary about what we offer and where to get it, and where we bow out. If you have only hearsay to go on for Kodak products, services, and literature useful in this field, please write to me. A biomedically oriented directory is in preparation. Let me know if you'd like a copy.



RICHARD FULLER

EASTMAN KODAK COMPANY
Kodak Office
Rochester, New York 14650
716 724-4624

Kodak



A standard communications link that facilitates conversation among instruments.

It wasn't long ago that all instruments were, in human terms, totally deaf and dumb. They could not hear instructions so you made them do their job by setting knobs and switches. And when the job was done, they could not tell you the results; the only way to find out was to read, and then analyze, their displays.

Many instruments have since learned to "talk." On command, they can output measurement results and transmit them remotely in code. More and more are being equipped to "listen": send them prearranged signals and they can program their own controls, remotely. Add a control function to such instruments—to tell them when to talk and when to listen—and they can communicate with each other automatically.

This sounds easy, but it hasn't been. Although the three basic elements for automatic instrumentation systems—talkers, listeners, and controllers—are readily available, one who sets out to design and assemble such a system quickly runs into severe frustrations. The different elements are rarely compatible; more often than not, they use different logic, speak a different language, and interconnect with different hardware.

Avoiding this electronic Tower of Babel is what the Hewlett-Packard Interface Bus (HP-IB) is all about. A standard interface system, the HP-IB forms a basic communications link that allows interconnected system components to communicate effectively, in an orderly and unambiguous manner. The interface system involves much more than the standardization of interconnecting cables; it also defines the interface logic capabilities within the system instruments, the scope of the data codes used on the interface, and the timing and control techniques for exchanging messages.

To talk or to listen: never a doubt.

In the HP Interface Bus, all system devices are exposed to all system communications. But a device can neither send nor receive a message unless told to do so by the system *controller*: at any given time, it can be either a *talker* or a *listener*, but not both. Listeners receive programming data from a controller or measurement data from talkers; talkers send measurement data to listeners. There can never be more than one active controller or one talker at the same time, but there can be as many as 14 concurrent listeners.

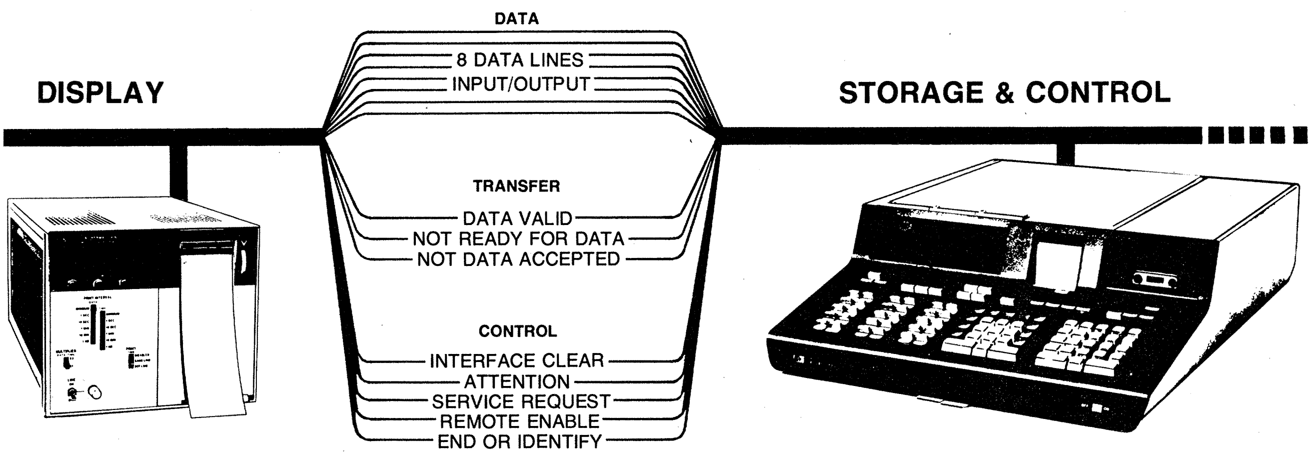
Depending on its capabilities, a device may play more than one role at different times. A calculator or computer, for example, can be talker, listener, or controller; a programmable digital voltmeter alternately talks when it outputs its measurement and listens when it's being programmed; a paper punch can only play the role of listener.

The bus: a common interconnection.

All system devices are interconnected on a common set of 16 signal lines. Eight of these lines form the *data bus* which carries all data messages bidirectionally between talkers and listeners, in bit-parallel byte-serial fashion. The *transfer bus* uses three lines to ensure that data is interchanged only from the intended talker to the designated listeners, through an interrogation and reply sequence. The remaining five signal lines constitute the *control bus*, by which the controller directs an orderly flow of information across the interface, sending commands to the devices and receiving service requests from them. Although system control is always delegated (never assumed), it may be shifted from one system device to another.

HP-IB simplifies systems, small or large.

An HP-IB system can consist of one talker, one listener, and *no* controller; for example, a counter and digital printer for semi-automatic data logging. At the other extreme, a completely auto-



matic system may include as many as 15 instruments possessing stimulus, measurement, display, storage, and control capabilities. Whether a calculator, computer, or the processor of a "smart" instrument, the controller operates the entire system through an interface connection (a single I/O card)—an obvious economy compared to non-bus systems that require one I/O card for each instrument.

System configuration: fundamental problems solved.

Although the HP-IB does not provide instant systems, it does solve the fundamental interface problems that have plagued instrumentation system designers and users until now. Designers no longer need to invent custom interfaces for each new product; users no longer need to familiarize themselves with an interface unique to each new product. Cable and connector problems are minimized by the use of a simple, passive cable interconnection system.

HP-IB protocol allows the designer to assign talk and listen addresses to each device to suit his purposes. Each address is set at the device to any desired value, through a switch on a rear panel, jumper wires on a PC board, or other convenient means.

The HP-IB imposes minimal functional restrictions on data transfer between a talker and a listener. For example, data bytes may consist of from one to eight bits. Once a device is addressed, data can be transferred using any coding and format convention appropriate to the application. The most commonly used codes are the printable characters of the ASCII code set, and the number representations are typically FORTRAN compatible.

Minimal timing restrictions are imposed on the data rates by the HP-IB. Data is transferred asynchronously at a rate that suits the devices involved; burst rates of 1 megabyte per second are possible over limited distances. Data may be transferred directly between devices, thus reducing message traffic on the bus.

More than a theory, HP-IB is a reality now.

Within Hewlett-Packard, the common interface concept has already been incorporated into a growing list of more than 20 instruments and accessory products as well as our programmable desk-top calculators. Outside the company, the HP-IB has served as a proposed interface standard now under active consideration by the IEC and the IEEE. Thus the possibility exists that this concept will become an international communication link applicable to instruments and peripherals without regard to manufacturer or nation of origin.

Obviously an idea whose time has come, the common interface is here now, still another aspect of the new measurement technology that is taking shape at Hewlett-Packard.

For more information, write to us. Hewlett-Packard, 1507 Page Mill Road, Palo Alto, California 94304.

HEWLETT PACKARD

Sales and service from 172 offices in 65 countries.
Palo Alto, California 94304

00436

Mail to: Hewlett-Packard, 1507 Page Mill Road, Palo Alto, CA 94304

Please send me further information on the
Hewlett-Packard Interface Bus.

Name__________ Title__________
Company__________
Address__________
City__________ State__________ Zip__________

6 December 1974, Volume 186, Number 4167

SCIENCE

The Decline of Merit

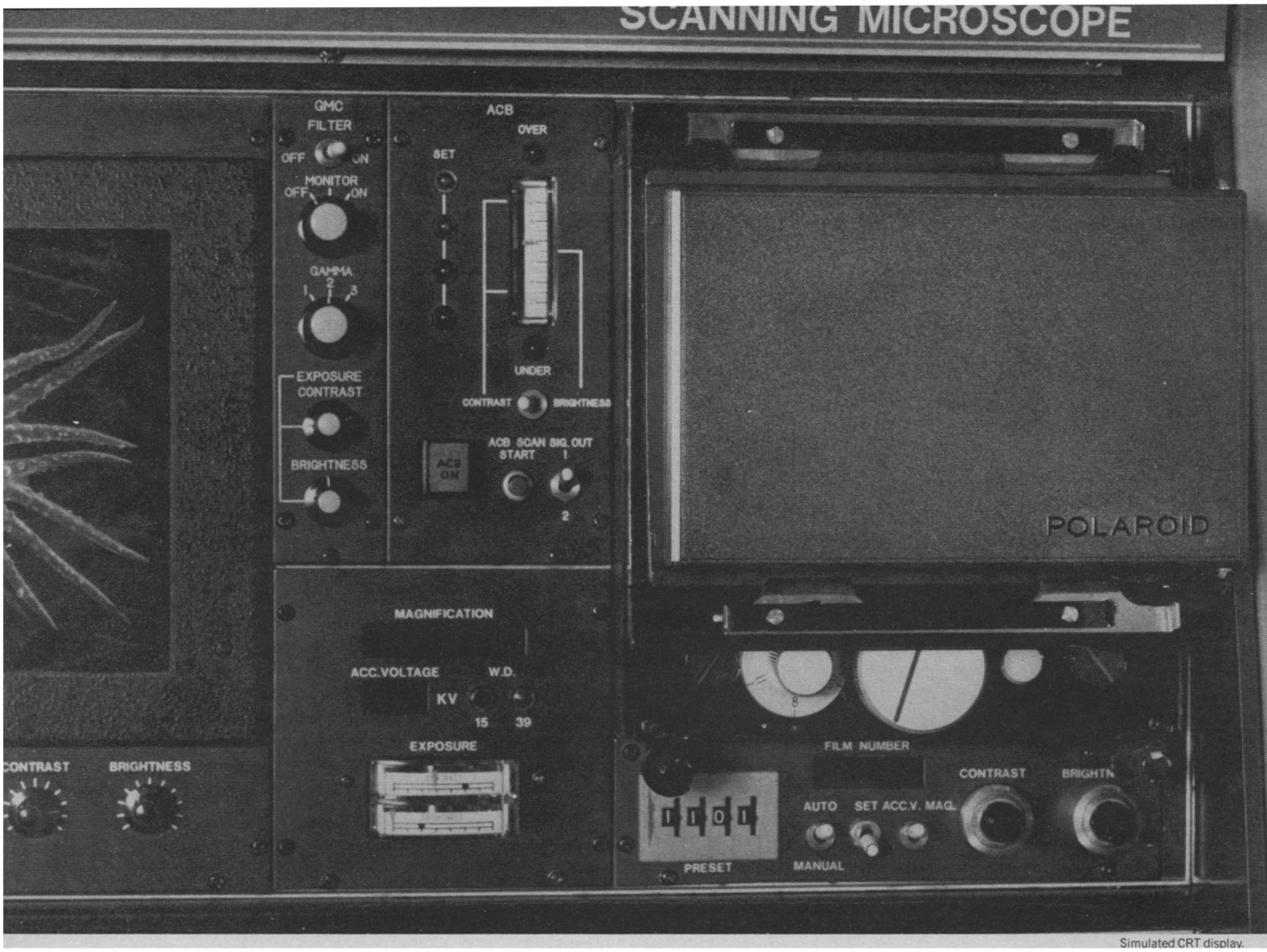
The present list of dire predictions is long enough: loss of confidence in representative government, depression, collapse of the world monetary system, nuclear terrorism, or Manhattan Island bought by an Arab oil potentate. To these we must add one more: the end of merit as the primary means by which professionals are recruited, selected, rewarded, promoted, and judged. This could be the last straw. Merit is the principle that selection, promotion, and reward for individuals should be based on the quality of their individual performance. If this principle is lost, mediocrity becomes inevitable.

The evidence is all around us that adherence to the merit principle is on the decline. Seniority, job rights, and tenure dominate most civil service systems in the country. Effective merit compensation and performance evaluation systems are rare in state and local governments and in public school systems, and proposals for their adoption are under strong attack. Our daughter comes home from the sixth grade with a glowing report card and a marvelous social experience, but tells us candidly that she hasn't been required to learn very much. In the foreign service of the United States, the "up or out" principle is under serious fire. While many unions and employee organizations genuinely support merit and have often promoted the adoption of merit systems, the union hiring hall may not be far off for most professionals and public servants.

In the academy itself, tenure is on its way to becoming a job rights system for the protection of mediocrity rather than the right of free inquiry. And, except for the first tenure decision made too early in the professor's professional career, academe has little stomach for the hard choices.

Racial and sexual discrimination in personnel systems, the professions, and labor unions has turned a spotlight on the personnel process much as did widespread corruption and political patronage in an earlier time. The attention which the urgent need for aggressive affirmative action for employment of women and minorities has focused on the justice of personnel decisions is long overdue. Good affirmative action programs honor the merit principle because the goal of equal employment opportunity *is* a merit system and the means of its attainment must be consistent with that goal. Affirmative action advocates who are working zealously to correct the dreadful effects of racial and sexual discrimination know they must adhere strongly to the merit principle lest they hand the remaining racists and sexists, and also some serious liberal doubters, a crowbar—reverse discrimination and lowered standards. Merit system advocates know that a merit personnel system is a hollow mockery if the work force thus selected is not both determined by merit and representative of the society it serves. Those who believe in merit and those who believe in affirmative action must hold together or lose both. Merit, equal employment opportunity, and affirmative action are all soldiers in the same cause—a just, whole, fair, productive, and representative society.

Brains and sound quality performance will be the basis of whatever success our society has in dealing with the seemingly intractable problems of our times. American society must quite literally live by its wits in a time when its resources, its oceans, its lands, and its special political institutions won't carry the weight they once did, and when military strength cannot and should not. Strengthening the principle of merit in our society thus becomes a matter of survival.—BREWSTER C. DENNY, *Graduate School of Public Affairs, University of Washington, Seattle 98105*



Simulated CRT display.

Polaroid's instant negative pack film can back up almost any professional photographic instrument you now use.

Whether you make photomicrographs, CRT recordings or just quick photos for record purposes, Polaroid's Type 105 Land film will back up your equipment with a kind of flexibility you've never had before.

With Type 105 you get an instant photograph with superb tonal gradation and sharp detail, ready for immediate use. And you also get an instant professional-quality negative.

Without a trip to the darkroom.

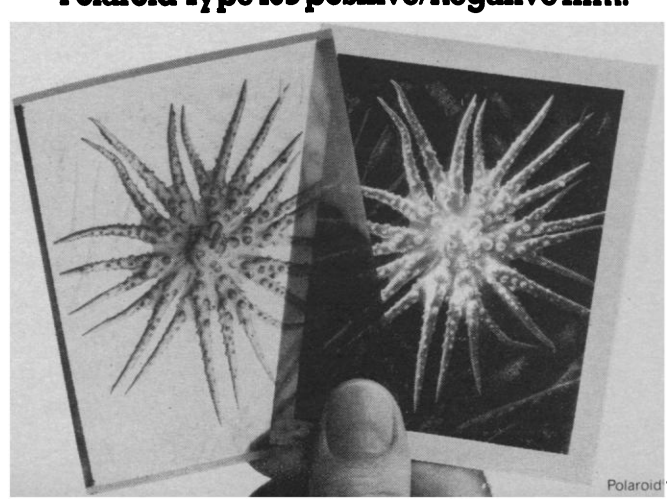
After a simple clearing and washing of the negative, you can make as many copies and enlargements as you need.

Type 105 comes in a 3¼ x 4¼ inch film pack that fits any instrument or camera that accepts a Polaroid pack film back. And with our Model 405 pack film holder our film can be used with most 4 x 5 inch cameras and instruments. In addition, pack film is economical and easy to use. And since it develops outside the camera, you don't have to waste time between shots. Speed is a convenient 75 ASA.

With our 105 you know what you've got when you've got it. And thanks to the instant negative, you can get as many copies and enlargements as you want when you want them.

See your photo dealer for more details.

Polaroid Type 105 positive/negative film.



(Continued from page 908)

RECENT DEATHS

Fred Allison, 92; former professor of physics, Alabama Polytechnic Institute; 2 August.

Virginia Apgar, 65; clinical professor of pediatrics, Cornell University Medical College; 7 August.

David W. E. Baird, 76; dean emeritus, University of Oregon Medical School; 28 July.

Harold W. Bales, 48; associate professor of surgery, University of Rochester; 5 August.

Wallace R. Brode, 74; chemist and former associate director, National Bureau of Standards; 10 August.

Charles W. Brown, 99; founder, geology department, Brown University; 22 July.

Herbert B. Bruner, 81; former professor of surgery, University of Rochester; 5 August.

David A. Clarke, Jr., 55; professor of agricultural economics, University of California, Berkeley; 31 July.

William H. Conley, 67; chancellor emeritus, Sacred Heart University; 18 July.

Louis Fliegler, 57; chairman, special education department, Kent State University; 16 July.

Calvin B. Hoover, 77; former dean, Graduate School of Arts and Sciences, Duke University; 23 June.

Wendell E. Kraft, 72; associate professor of engineering, Trinity College; 15 July.

Fred F. Liniger, 81; former director, agricultural experiment station, Pennsylvania State University; 22 July.

Barbara Lipton, 46; clinical professor of anesthesiology, Mount Sinai School of Medicine; 20 July.

Virgil I. Mann, 53; professor of geology, University of North Carolina, Chapel Hill; 24 July.

Edgar Neptune, 49; professor of surgery, University of Maryland; 27 June.

Robert F. Oxnam, 59; president, Drew University; 19 July.

Willem Prins, 44; professor of physical chemistry, Syracuse University; 20 July.

George G. Stern, 50; professor of psychology, Syracuse University; 20 July.

George N. Wise, 59; professor of ophthalmology, Albert Einstein College of Medicine; 31 July.